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10/816,025	03/31/2004	Himanshu Pokharna	42P19252	9321

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EXAMINER	
PAPE, ZACHARY	

ART UNIT	PAPER NUMBER
2835	

DATE MAILED: 03/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/816,025	POKHARNA ET AL.	
	Examiner	Art Unit	
	Zachary M. Pape	2835	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 January 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29* is/are pending in the application.

4a) Of the above claim(s) *8-14* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7, 15-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

The following detailed action is in response to the correspondence filed 1/9/2006.

The objection to the drawings has been withdrawn in view of the feature being canceled from claim 22.

The 112 2nd paragraph rejection to claim 22 has been withdrawn in view of the amendment to claim 22.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 23-29 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 23 recites, "a tube having n internal fins integral with the tube", however the specification fails to describe the fins being integral with the tube as claimed. The examiner recognizes the recitation in paragraph 12 that, "internal fins are built into a heat exchanger tube to provide a more uniform temperature distribution of working fluid within the tube", however the examiner respectfully notes that such a recitation does not satisfy the language, "integral with the tube". Similarly, the recitation, "The fins 315 in

the tube may be manufactured at the same time as the heat exchanger tube 310. Thus the internal fins 315 may comprise the same material as the heat exchanger tube" in paragraph 12 fails to satisfy the language, "integral with the tube". Finally the recitation in paragraph 18 that, "a plurality of fins may be manufactured inside of a flattened tube" fails to satisfy the language, "integral with the tube".

As per MPEP 2163.06, the examiner has considered the added subject matter as part of the present examination. However since no definition of "integral" was presented in the specification (since the specification lacks support for the limitation), the examiner has taken "integral" to mean, "A complete unit, A whole" per The American Heritage College Dictionary, 4th edition.

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 16-17, and 22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claim 16, claim 15 recites, "a flattened tube" and dependent claim 16 recites, "wherein the heat exchanger tube has a diameter" which is not possible since a diameter is an attribute of something which is round. Since the tube is now "flattened" as claimed, it is not possible for the "flattened tube" to have a diameter.

Claim 22 recites, "wherein the means for providing a uniform temperature distribution comprises the heat exchanger tube" which is indefinite since the parent

claim recite, "means for providing a uniform temperature distribution of working fluid within a heat exchanger tube". As presently written claims 21 and 22 essentially read, "a heat exchanger tube for providing uniform temperature distribution of working fluid within a heat exchanger tube" which is indefinite.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3, 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Broder et al. (US 6,226,178) in view of Bucey et al. (US 4,171,015) and further in view of Wang et al (US 6,382,307).

With respect to claim 1, Broder et al. teaches a mobile computing device, comprising: a processor (20), an evaporator (27) thermally coupled to the processor, wherein a working fluid of the evaporator picks up heat generated by the processor; and a heat exchanger (26) coupled to the evaporator to remove heat from the mobile computing device. Broder et al. fails to teach that the heat exchanger comprises a flattened tube and a plurality of fins coupled to the outside of the tube, wherein the plurality of fins extend around the tube.

Bucey et al. teaches a heat exchanger tube (48) comprising a flattened tube (As illustrated in Fig 1) and a plurality of fins (16) coupled to the outside of the tube. It

would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the heat exchanger of Broder et al. with the flattened tube and fins of Bucey et al. Replacing the heat exchanger (26) of Broder et al. with the flat tube and fin construction of Bucey et al. would reduce manufacturing complexities involved in producing round tubes which are taught by Broder et al. in Fig 3 (Bucey; Column 1, Lines 28-33). Additionally, the need for a separately manufactured heat sink would no longer be required reducing manufacturing costs.

With respect to the fins extending around the tube, Wang et al. teaches the conventionality of having fins (2) extending around a tube (1). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Wang et al. with that of Broder et al. and Bucey et al. to increase the heat dissipating area so as to have a preferred heat dissipating effect (Wang: Column 2, Lines 60-62).

With respect to claim 2, Bucey et al. further teaches that the flattened tube is approximately two millimeters from top to bottom and eight millimeters from side to side. (The American Heritage College Dictionary 4th edition on page 70 defines approximate as "very similar, closely resembling". Therefore as best the examiner can tell, the tube as illustrated in Fig 1 of Bucey is approximately 2mm from top to bottom and 8mm from side to side).

With respect to claim 3, Broder et al. further teaches a fan (26b) coupled to the heat exchanger to reject the heat from the working fluid in the heat exchanger.

With respect to claim 7, Bucey et al. further teaches that the working fluid is water (Column 4, Lines 7-9).

Claims 4-6 rejected under 35 U.S.C. 103(a) as being unpatentable over Broder et al. in view of Bucey et al. in view of Wang et al. and further in view of Pearson (US 3,394,736).

With respect to claims 4 and 5, Broder et al. in view of Bucey et al. and Wang et al. teach the limitations of claim 1 above, but fails to teach that the flattened tube comprises internal fins. Pearson teaches the conventionality of placing internal fins within a tube (As illustrated in Fig 2). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the internal fins of Pearson with the flat tube and heat exchanging apparatus of Bucey et al., Broder et al. and Wang et al. respectively to provide an improved heat transfer medium flow through the tube (Column 2, Lines 64-67). Providing improved heat transfer increases the cooling of the CPU and therefore increases the operation of the mobile computer.

With respect to claim 6, Pearson further teaches that the insert is helically shaped (As illustrated in Fig 1).

Claims 23-24, 26-27, 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Broder et al. in view of Pearson.

With respect to claim 23, Broder et al. teaches a heat exchanger (26), comprising: a tube (25) a plurality of fins (26a) coupled to the outside of the tube to help

remove heat from the tube. Broder et al. fails to teach that the tube has n internal fins integral with the tube to provide an even temperature distribution to the working fluid inside of the tube, wherein n is an integer greater than or equal to one. Pearson teaches a tube (10) having n internal fins (20) integral with the tube (As illustrated in Pearson Fig 3) to provide an even temperature distribution to the working fluid inside of the tube, wherein n is an integer greater than or equal to one. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the fin insert of Pearson with the fins (26a) and thermal management system of Broder et al. to provide an improved heat transfer medium flow through the tube (Pearson; Column 2, Lines 64-67). Providing improved heat transfer increases the cooling of the CPU and therefore increases the operation of the mobile computer.

With respect to claim 24, Pearson further teaches that the n internal fins are built into the tube (As illustrated in Figs 2 and 3).

With respect to claim 26, Broder et al. further teaches that the heat exchanger is part of a refrigeration loop (The definition of refrigeration per The American Heritage College Dictionary 4th edition is: "To cool or chill", Page 1170. Further Broder satisfies the definition of a loop in that the coolant within the tubes loops from the evaporator (where the liquid evaporates) traveling in the vapor form to the condenser (where the vapor condenses back to a liquid) and further travels back to the evaporator completing the cooling process) wherein the heat exchanger of Broder et al. is designed to cool the liquid within the tubes.

With respect to claim 27, Broder et al. further teaches that the heat exchanger is part of a two-phase loop (As disclosed by Broder, there is an evaporator (where the liquid transformed into a first, gaseous phase) and a condenser (where the liquid is transformed into a second, liquid phase) wherein the loop is defined as the liquid being evaporated in the evaporator, traveling in the vapor form to the condenser where the vapor condenses back into a liquid where it travels back to the evaporator thereby completing the cooling loop).

With respect to claim 29, Broder et al. further teaches that the tube is made of copper (Column 3, Line 43). Pearson fails to teach specifically that the internal fins comprise copper, however Pearson does teach in Column 3, Lines 55-59 that the internal fins are normally formed of an alloy having a greater hardness than that of copper. Therefore it would have been obvious to one of ordinary skill in the art to combine another metal with copper to create an alloy for the internal fins, thereby having internal fins that comprise copper, since copper is a notoriously old and well known material in the pipe art as suggested by the Pearson reference.

Claims 15-22 and 25 are rejected under 35 U.S.C 103(a) as being unpatentable over Broder et al. in view Tomioka (US 6,900,990) in view of Bucey et al. and further in view of Pearson.

With respect to claims 15, 21, and 22, as best can be understood by the examiner, Broder et al. teaches a thermal management system of a computer system, comprising: a heat generating component (20), a cold plate (31) coupled to the

component to remove heat from the component (As illustrated in Fig 3), wherein the heat is transported via a working fluid, and a heat exchanger (26). Broder et al. fails to teach a pump coupled to the cold plate to transport the working fluid from the cold plate to the heat exchanger, wherein the heat exchanger comprises a flattened and a tube filling that closely fits the tube.

Tomioka teaches a pump (72) coupled to a cold plate (71) to transport working fluid from the cold plate to a heat exchanger (32/41). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the pump of Tomioka with the thermal management system of Broder et al. to provide greater circulation to the liquid coolant to improve cooling performance of the processor (Tomioka; Column 1, Lines 54-58).

With respect to the heat exchanger comprising a flattened tube, Bucey et al. teaches a heat exchanger tube (48) comprising a flattened tube (As illustrated in Fig 1). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Bucey et al. with that of Broder et al. since the flattened tube of Bucey et al. provide efficient transfer of heat (Column 4, Lines 5-7).

With respect to the heat exchanger comprising a tube filling, Pearson teaches the use of a fin insert (18) designed to be inserted into a tube (10) as illustrated in Figs 1, 2. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the fin insert of Pearson with the heat exchanger (26) and thermal management system of Broder et al. to provide further improved heat transfer medium flow through the tube (Column 2, Lines 64-67). Providing improved heat

transfer increases the cooling of the CPU and therefore increases the operation of the mobile computer.

With respect to claim 16, as best can be understood by the examiner, Pearson further teaches that the tube filling has a diameter that is less than or equal to the flattened tube of Bucey et al.

With respect to claim 17, as best can be understood by the examiner, Bucey et al. further teaches that the heat exchanger tube is approximately five millimeters in diameter (The American Heritage College Dictionary 4th edition on page 70 defines approximate as "very similar, closely resembling". Therefore as best the examiner can tell, the flattened tube as illustrated in Fig 1 of Bucey et al. is approximately (or very similar to) 5mm in diameter).

With respect to claim 18, Pearson fails to teach that the tube filling comprises plastic. It would have been obvious to one of ordinary skill in the art at the time the invention was made to comprise the tube filling of plastic since it was a well known material for creating tube fillings at the time of the invention and since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416. Forming the tube filling of plastic provides the benefit of rust resistance, which would increase the life of the tube insert thereby increasing the quality/efficiency of cooling in the thermal management system.

With respect to claim 19, Pearson further teaches that the tube filling comprises aluminum (Column 3, Lines 58-59).

With respect to claim 20, Pearson further teaches that the tube filling is helically shaped (As illustrated in Fig 1).

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Broder et al. in view of Pearson and further in view of Tomioka.

With respect to claim 25, Broder et al. in view of Pearson discloses all the limitations as applied to claim 23 above, but fails to specifically teach that the heat exchanger is part of a single-phase loop. Tomioka teaches a heat exchanger (41) which is part of a single phase loop. It would have been obvious to one of ordinary skill in the cooling art at the time the invention was made to combine the single phase loop of Tomioka with the heat exchanger and fins of Broder et al. and Pearson respectively to provide a heat exchanger with good circulation which efficiently transfers heat from the microprocessor (Tomioka; Column 1 Lines 54-58)

Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Broder et al. in view of Pearson and further in view of Klawuhn et al. (US 5,613,523).

With respect to claim 28, Broder et al. in view of Pearson teaches the limitations as applied to claim 23 above, but fails to teach that the tube is four to six millimeters in diameter. Klawuhn et al. teaches a tube (1) with a diameter between 4mm and 6mm (Column 1, Lines 46-48). It would have been obvious to one of ordinary skill in the cooling art at the time the invention was made to combine the 4-6mm tube of Klawuhn

et al. with the heat exchanger and fins of Broder et al. and Pearson respectively so that the tube has the appropriate strength to hold high pressure hot water (Klawuhn; Column 1, Lines 46-48, "so that the pressure hose fulfills the requisite test conditions" means that the tube therefore would not burst causing high pressure hot water to spill onto the sensitive components within). Manufacturing a tube with the optimum dimensions as specified by Klawuhn will keep the tube from rupturing causing damage to other internal computer components.

Response to Arguments

4. Applicant's arguments filed 1/9/2006 to amended claims 1-7 have been fully considered and are persuasive. As such the examiner has applied a new rejection to claims 1-7 per the detailed action above to meet the newly added claim limitations.

Applicant's arguments filed 1/9/2006 to claims 15-29 have been fully considered but they are not persuasive.

With respect to claims 15-20, that, "Broder, Pearson, and Tomioka either alone or in combination, do not teach or suggest a flattened tube and a tube filling that closely fits the tube", the examiner respectfully disagrees. The examiner respectfully notes that the claim language very broadly recites, "a tube filling that closely fits the tube". As best can be understood by the examiner the tube filling of Pearson does in fact "closely fit the tube" as broadly required.

The examiner further notes that Pearson explicitly teaches an interference fit between the tube and the filling (Pearson: Column 4, Lines 73-74) which is what is

required by the applicants present invention (See specification Paragraph 9, "the tube insert 200 may be closely fitted inside the tube").

With respect to claims 21-22 that, Pearson and Tomioka are insufficient to teach or suggest a uniform temperature distribution as recited in the claim", the examiner respectfully disagrees. In column 1, Lines 53-63 Pearson clearly details how prior inventions result in un-uniform temperature distribution ("As the medium flows through a tubular heat exchanger, it tends to "channel" in a flow path having the least resistance to flow and the mechanical surfaces of the heat exchanger are often not directly exposed to that portion of the heat transfer medium which is most capable of receiving or transmitting heat" – in other words there is uneven temperature distribution). Then in column 2, Lines 5-25 Pearson clearly details how the present invention provides for more uniform temperature distribution ("Such spiraling of the fins imparts a rotational movement to the heat exchange medium... and centrifugal forces acting upon the molecules of the heat exchange medium tend to throw the heavier molecules radially outward into engagement with the inner surface of the tubular member" – in other words the temperature of the heat exchange medium is more uniform due to the turbulence).

With respect to claims 23-29 that, "Broder and Pearson, either alone or in combination, do not teach or suggest internal fins integral with the tube", the examiner respectfully notes that the recitation, "integral" is not supported in the specification. Regardless as per MPEP 2163.06 the examiner has considered the limitation and in view of the definition of integral from The American Heritage College Dictionary 4th

edition, the fins of Pearson are clearly integral or "A complete unit, A whole" with the tube as shown in Fig 3.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zachary M. Pape whose telephone number is 571-272-2201. The examiner can normally be reached on Mon. - Thur. & every other Fri. (8:00am - 5:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynn Feild can be reached at 571-272-2092. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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